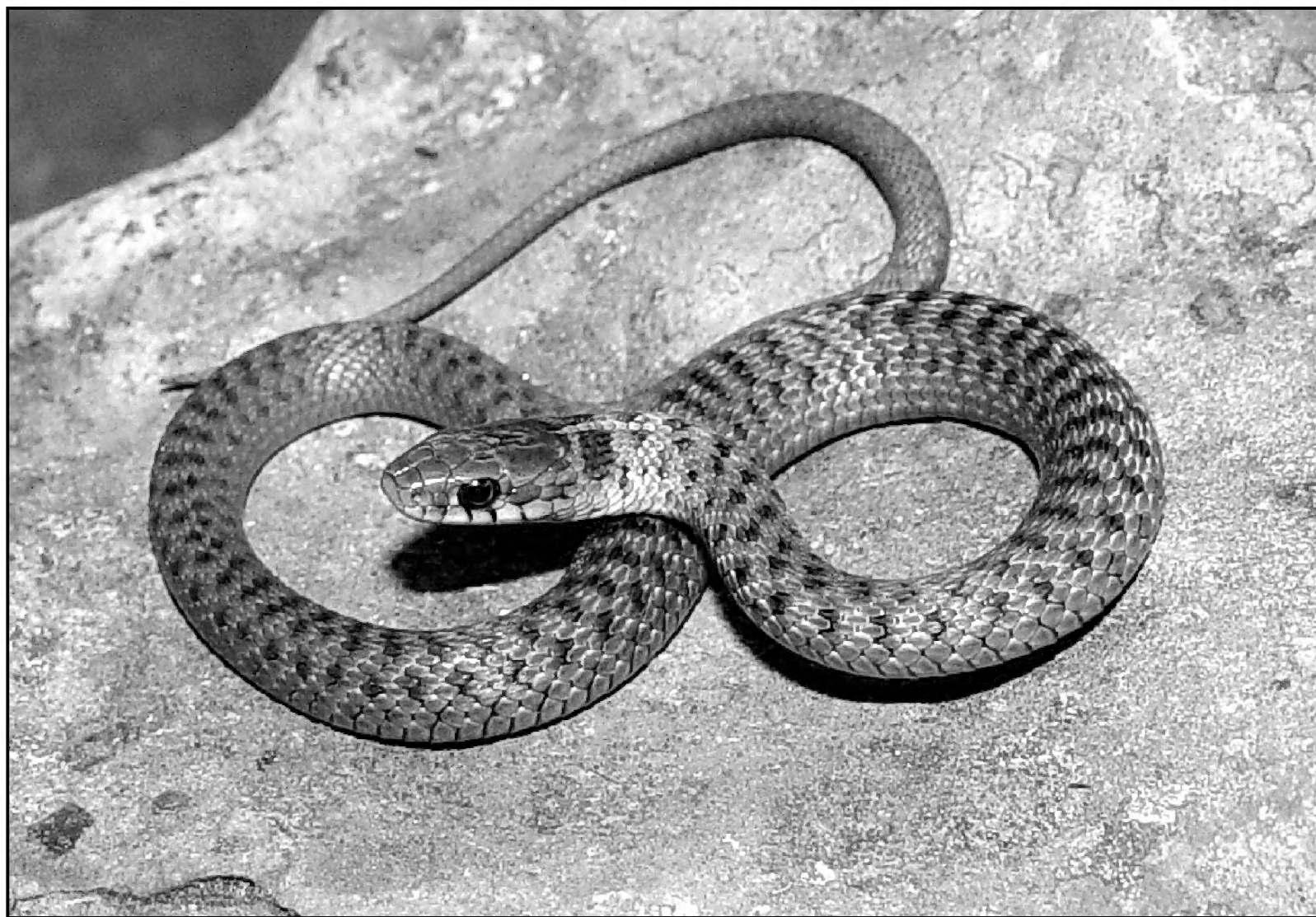

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BULLETIN OF THE CHICAGO HERPETOLOGICAL SOCIETY

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Notes on Mexican Herpetofauna 16: Captive Husbandry–Propagation of the Exiled Mexican Garter Snake, *Thamnophis exsul* Rossman, 1969

David Lazcano¹, Alan Kardon², Rebecca J. Muscher² and Jorge A. Contreras-Lozano¹

Abstract

The exiled garter snake, *Thamnophis exsul*, is regarded as the rarest species of garter snake (Rossman et al., 1996). *Thamnophis exsul* is restricted to isolated areas of the Sierra Madre Oriental of Mexico. The authors report on the natural history and first captive reproductive event for *T. exsul*.

Resumen

La jarretera Mexicana exilada, *Thamnophis exsul*, es considerado la especie más rara de las serpientes acuáticas (Rossman et al., 1996). *Thamnophis exsul* está restringido a zonas aisladas de la Sierra Madre Oriental de México. Los autores aquí reportan sobre la historia natural y el primer evento reproductiva en cautiverio para *T. exsul*.

Introduction

Garter snakes, members of the genus *Thamnophis*, are widely distributed throughout North America and México. In some parts of their range they are extremely abundant; in other areas they face serious threats of extirpation caused by severe land alteration. As a group the various species of *Thamnophis* are perhaps the most common and widespread of all North American snakes (Rossman, 1970; Rossman et al., 1996). Because of their abundance, relative ease of capture, and usually docile nature, garter snakes have often been chosen as the subject of ecological and behavior studies by biologists (Rossman et al., 1996).

Over the course of the last 40 years, an enormous effort has been made to recognize the true number of species, and subspecies of *Thamnophis*. Thirty species of *Thamnophis* are currently recognized in the Americas (Rossman et al., 1996). Twenty-six species of *Thamnophis* are recorded for Mexico (Liner and Casas-Andreu, 2008).

In concert with inventory surveys, researchers have made limited studies concerning the natural history/biology of North American *Thamnophis* (Rossman and Burbrink, 2005). Natural history/biology information as it pertains directly to Mexican species of *Thamnophis* is scant. The exiled Mexican garter snake, *Thamnophis exsul*, is considered the rarest species of *Thamnophis* (Rossman et al., 1996). The first description of *T. exsul* was from a single specimen collected from San Antonio de las Alazanas, Coahuila, Mexico (Rossman, 1969). Twenty years later, a re-description of the species was published in the *Proceedings of the Biological Society of Washington* (Rossman et al., 1989).

Aspects of *T. exsul* natural history are poorly known (Rossman et al., 1989; Lazcano, 2005; Lazcano et al., 2010). *Thamnophis exsul* is sympatric with the following species: Galeana false brook salamander, *Pseudoeurycea galeanae*; primeval flat-footed salamander, *Chiropterotriton priscus*; spotted chirping frog, *Eleutherodactylus* (*Syrrhophus*) *guttulatus*; graphic spiny lizard, *Sceloporus grammicus*; minor lizard, *Sceloporus minor*; blue-bellied lizard, *Sceloporus parvus*; torquate lizard, *Sceloporus*

rus torquatus; northern alligator lizard, *Barisia ciliaris*; mountain horned lizard, *Phrynosoma orbiculare*; Nuevo León graceful brown snake, *Rhadinaea montana*; Texas patch-nosed snake, *Salvadora grahamiae lineata*; Mexican yellow-bellied brown snake, *Storeria hidalgoensis*; Mexican highland garter snake, *Thamnophis pulchrilatus*; Tamaulipan rock rattlesnake, *Crotalus lepidus morulus*; Mexican black-tailed rattlesnake, *C. molos-*

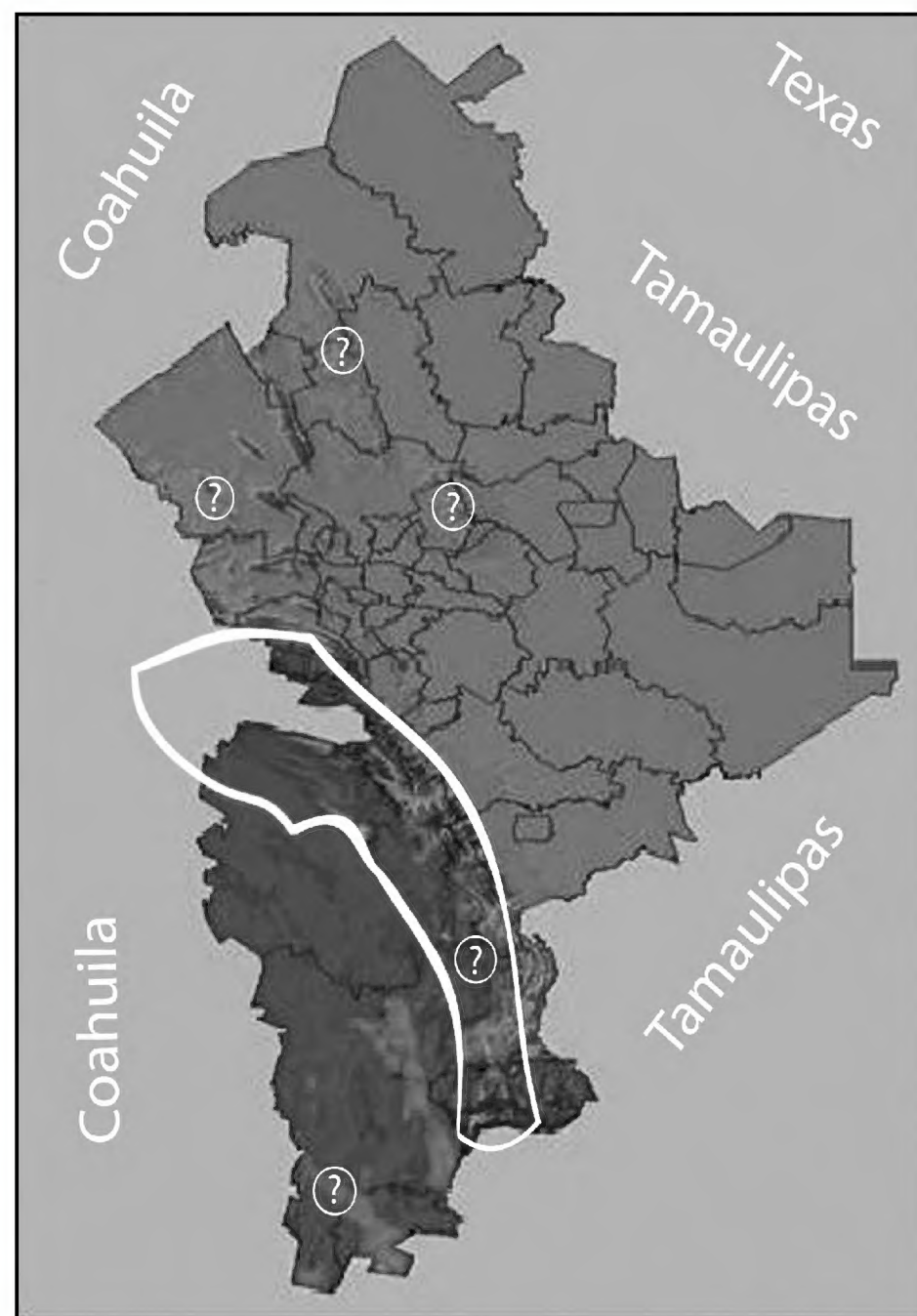


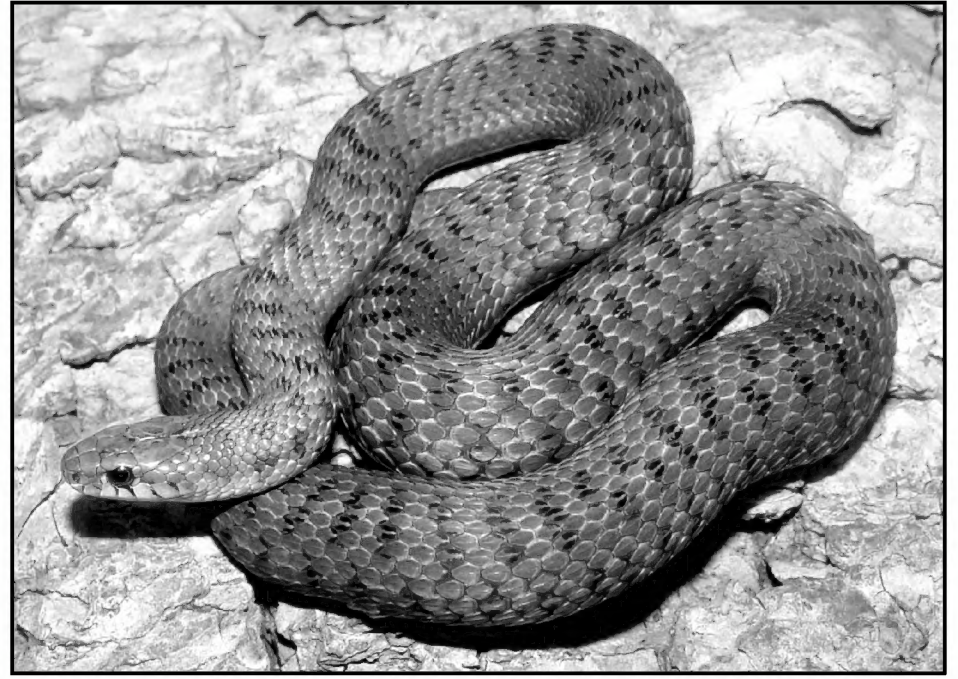
Figure 1. Possible distribution of *Thamnophis exsul* in Nuevo León and surrounding Mexican states. Question marks indicate localities in the Sierra Madre Oriental where insufficient survey work has been done.

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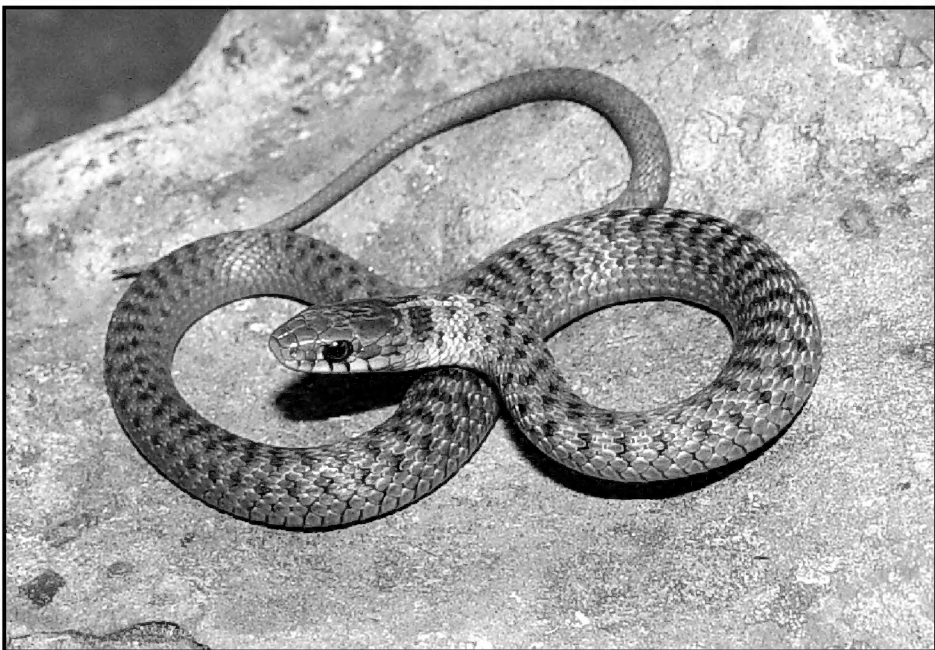
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Female exiled garter snake, *Thamnophis exsul*, from the vicinity of Ejido El Aserradero, Tamaulipas, Mexico. Photograph by Alan Kardon.



Female exiled garter snake, *T. exsul*, from the Sierra San Antonio Peña Nevada, Zaragoza, Nuevo León, Mexico. Photograph by Alan Kardon.



Neonate male exiled garter snake, *T. exsul*. Photograph by Alan Kardon.



Burned areas like this in the Sierra San Antonio Peña Nevada could be sites for recolonization by *T. exsul*. Photograph by David Lazcano



Typical habitat for *T. exsul* near the Ejido El Aserradero, Tamaulipas, with *Agave montana*. Photograph by Alan Kardon.



Typical habitat for *T. exsul* in the Sierra San Antonio Peña Nevada with *Agave americana*. Photograph by David Lazcano.

sus nigrescens, and eastern twin-spotted rattlesnake, *C. pricei miquihuanus* (Rossman et al., 1989; Liner and Dixon, 1992; authors' pers. observations).

Thamnophis exsul holds protected status in México, and is listed as threatened by SEMARNAT NOM-059-ECOL-2001. The general objective of this study was to establish baseline parameters for captive husbandry/propagation of *T. exsul*.

Description, Habitat and Range

Thamnophis exsul is the smallest garter snake. When Rossman et al. (1989) redescribed the species, the longest specimen known to them was 360 mm in total length. Rossman et al. (1996) mention a specimen 463 mm total length. However, captive specimens at the San Antonio Zoo have reached lengths greater than previously documented—over 500 mm total length. The dorsal pattern of *T. exsul* undergoes a visible ontogenetic change with age (Rossman, 1969). Juveniles tend to have an olive dorsal pattern with black speckling (dorsally and laterally) and a yellow stripe ranging from the nuchal to the tip of the tail. Adults dorsally darken with more speckling; the yellow dorsal line loses intensity and seems to fade with age.

Snakes of the genus *Thamnophis* are generally associated with permanent water bodies or wetlands. However, *T. exsul* observed in the wild by the authors were never associated with a permanent water body or wetland. Individual specimens were found on seasonally wet hillside slopes in isolated areas of the Sierra Madre Oriental. *Thamnophis exsul* is currently recorded from the following montane areas (Figure 1):

- Central-eastern portions of Coahuila, in the municipality of Arteaga*
- Southeastern Nuevo León, in the municipality of Zaragoza
- Central-western Tamaulipas, in the municipality of Miquihuana

* many distributional gaps still need to be resolved between Arteaga, Coahuila southward to Miquihuana, Tamaulipas (Rossman, 1969; Rossman et al., 1989; Canseco-Marquez et al., 2004).

Thamnophis exsul has been recorded from between 2650 and 2800 m elevation (Rossman et al., 1989) and 2650–2860 m elevation (Canseco-Marquez et al., 2004). Two specimens collected by the authors were found at over 3200 m elevation.

The specimens involved in this study were collected at two separate localities. The original adults (1.1) were collected during a 2002 through 2005 flora/fauna survey of Sierra San Antonio Peña Nevada, Zaragoza, Nuevo León. This site was visited monthly during the course of the three-year survey. Eight individual *T. exsul*—three active and five inactive—were observed during this period. Four individuals were observed in a chaparral plant community—one active and three inactive. One inactive individual was observed in pine–oak forest and three additional specimens in agricultural areas—two active and one inactive. Two inactive specimens were observed in the spring, three active and two inactive observed in the summer, and one inactive individual observed in the fall.

An additional female was collected August 2006, near Ejido El Aserradero, Tamaulipas (municipality Miquihuana), a beautiful mountainous area nestled in the central-western part of

Tamaulipas, Mexico. *Thamnophis exsul* is associated with the following pine/oak species: *Pinus cembroides*, *P. hartwegii*, *P. nelsonii*, *P. pseudostrobus*, *P. strobiformis*, *P. tecocote*, *Quercus greggii*, *Q. laeta*, *Q. mexicana*, *Q. polymorpha* and *Q. pungens*. Other plants include madrone trees, *Arbutus xalapensis*, and agaves: *Agave asperrima*, *A. americana*, *A. aguey macroculmis*, *A. montana* and *A. scabra*.

With respect to their monthly activity periods, inactive individuals were observed on 1 April, 2 May, 1 June and 1 September. Active individuals were observed on 1 April, 1 June and 1 July. Microhabitat use for *T. exsul* was recorded as follows: under/on limestone rocks (one active and one inactive), under/around fallen logs (2 inactive), and in/around magueys or agaves (2 inactive). One active individual was observed moving along a trail, and another active individual was observed crawling over organic leaf litter.

Active/Inactive Elevation Patterns

- 2601–2800 m—six individuals (three active, three inactive)
- 3201–3400 m—one inactive individual
- 3401–3600 m—one inactive individual

Air temperatures at these two localities fluctuated between -12°C and 33°C seasonally. Humidity ranged from 12% to 100% depending on cloud coverage and the time of year.

Captive Husbandry and Reproduction

At the San Antonio Zoo adult *T. exsul* are housed in 90 cm long $\times$ 70 cm wide $\times$ 30 cm high glass aquaria with metallic screen lids. Cypress mulch is used as substrate. Flat rocks are piled 20 cm high at one end of each aquarium; a plastic hide box and a water bowl are provided at the other end. A single 75-watt basking light (with metal dome) is placed over the end of the aquarium above the rock pile. The surface temperature of the rock pile ranges between 35°C and 48°C . Basking is provided between the hours of 0900 and 1700 from 1 March through 31 August. Basking times are reduced from 1 November through 28 February. A 48-inch double fluorescent shop fixture is suspended 10 cm over the aquaria. The fixture houses a single ZooMed Reptisun 10.0 UVB fluorescent, and a single Service brand full-spectrum fluorescent. The photoperiod changes seasonally: long day lengths spring through summer (13 hours light/11 hours dark) and short day lengths fall through winter (10 hours light/14 hours dark). The room air temperature fluctuates according to the time of day and the season of the year. Spring/summer/fall (1 March–31 October) daytime air temperatures reach 23°C ; nighttime air temperatures drop to 14.5°C . Winter (1 November–28 February) daytime air temperatures reach 20°C ; nighttime air temperatures drop to 12°C . A Honeywell room humidifier is present in the room, and added humidity is provided by lightly spraying the aquaria with purified water once daily.

The *T. exsul* are maintained on a weekly diet of earthworms, *Lumbricus terrestris*, guppies, *Poecilia reticulata*, and rosy reds, *Pimephales promelas*. Adult *T. exsul* are also offered domestic day-old mice (pinks), *Mus musculus*. Chopped earthworms are mixed with the pinks so as to encourage a better feeding response to the rodent diet. Females seem to be more accepting of

Table 1. Data on three offspring born 19 February 2005 as a result of a mating between a pair of wild-caught *Thamnophis exsul* from Sierra San Antonio Peña Nevada.

Date	Offspring #1 (♀)			Offspring #2 (♂)			Offspring #3 (♂)		
	Weight (g)	Snout–vent length (mm)	Total length (mm)	Weight (g)	Snout–vent length (mm)	Total length (mm)	Weight (g)	Snout–vent length (mm)	Total length (mm)
19 February 2005	2.3	—	160	2.9	—	178	2.6	—	185
July 2006	13.1	260	334	11.5	265	335	13.1	263	335
17 December 2010	51.8	414	505	33.1	377	485	37.8	378	509

pinks; males tend to consume mostly the chopped earthworms, often leaving the pinks.

The *T. exsul* are put through a “resting” period from late December through March 1. They are not offered food during this rest period. Regular scheduled feeding for adult *T. exsul* occurs during the period between March 1 and November 15.

We have observed reproductive activity (copulation) in the species at the San Antonio Zoo during the months of April, June, July and October. The first recorded captive reproductive event of *T. exsul* occurred 19 February 2005 with the Sierra San Antonio Peña Nevada pair (Table 1). A second litter (0.0.4) was born to this pair on 30 September 2006. Unfortunately, none of the neonates survived and no data were taken.

The Aserradero, Tamaulipas, female was paired with the Sierra San Antonio Peña Nevada male in March 2008. Copulation was seen on 25 April 2008. The female’s body weight at pairing was 54 g (her weight at capture was 42.9 g). The Aserradero female gave birth to 1:1:1 on 2 November 2008 (Table 2). On 17 December 2010 the female’s body weight was 53.6 g, with a snout–vent length of 392 mm and total length of 523 mm.

Neonates are offered guppies, rosy reds and earthworms. Food is offered twice weekly.

The collection is currently comprised of four F₁ males, and three females (two F₁ and one wild-caught Aserradero founder).

Conclusion

The current program will continue to develop a better under-

standing of the optimization of food quantity and its frequency (depending on different life stages) as it directly relates to the successful captive husbandry / reproduction of *T. exsul*. Future projects may include a hormone study to assist us in determining the relationship between the presence of reproductive hormones, fatty bodies, and their link to reproductive behavior. The goal is to find a harmonious relationship between food, activity and reproduction. Future projects may include ways to monitor the testosterone levels of adult male *T. exsul*.

Control of the captive environment—photoperiod, temperature, and humidity—is paramount to a successful reproductive event with *T. exsul*. Observing *T. exsul* in its natural environment related directly to the success of this project. Increasing the accumulation of body fat should increase the chances of reproductive success with captive *T. exsul*. Annual, biannual, tri-annual, and tetrannual reproductive strategies in females in the wild are closely related to food intake of available food items in the environment. Fatty body accumulations govern the development of the offspring during the breeding season.

It is recognized that any effort in captivity has no real impact on the survival of any species in the wild if there is not a concerted effort to preserve natural habitat. Many of the ejidal communities in the range of *T. exsul* seem to be stable with very little expansion. Currently, minimal logging and land alteration is occurring in these areas. However, this can change in an instant with the failure to set aside adequate protected natural areas. Educating the local populace and setting aside protected tracts of habitat is a must for the long-term survival of any species.

Table 2. Data on three offspring born 2 November 2008 as a result of a mating between a male *Thamnophis exsul* from Sierra San Antonio Peña Nevada and a female from Ejido El Aserradero.

Date	Offspring #1 (♀)			Offspring #2 (♂)			Offspring #3*		
	Weight (g)	Snout–vent length (mm)	Total length (mm)	Weight (g)	Snout–vent length (mm)	Total length (mm)	Weight (g)	Snout–vent length (mm)	Total length (mm)
2 November 2008	3.4	—	—	3.8	—	—	—	—	—
23 January 2009	4.0	—	—	4.0	—	—	—	—	—
16 January 2010	—	—	—	8.4	—	—	—	—	—
17 December 2010	13.9	257	327	13.2	256	366	—	—	—

* Stillborn—no data taken.

Acknowledgments

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Special thanks to the following ejidal communities for allowing access to their land: Nuevo León: La Encantada, La Siberia,

Joya de San Lázaro, Joya de San Diego and Puerto El Pinal. Tamaulipas: Miquihuana, El Aserradero, La Marcela, and Valle Hermoso. And to the San Antonio Zoo, Texas, and the Facultad de Ciencias Biológicas de la Universidad Autónoma de Nuevo León for continued support with our ongoing studies of this extraordinary species.

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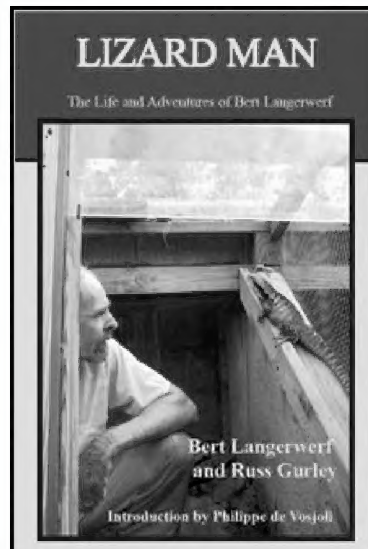
Book Review: *Lizard Man: The Life and Adventures of Bert Langerwerf* by Bert Langerwerf and Russ Gurley. 2009. Living Art Publishing, Ada, Oklahoma, www.livingartpublishing.com ISBN 0-9787556-6-9.

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This book is about, by, and a tribute to the late Bert Langerwerf, who was a hands-on herpeto-problem-solver and an unconventional genius. His lizard “ranch” was an array of hand-built breeding vivaria, deceptively simple in their construction — a mark of genius itself since anyone can create something complicated. He had a talent for converting what he learned from lizards into pragmatic productivity. And he was continually pushing back the frontiers of what we knew about reptiles. For example, by borrowing and modifying certain Dutch agricultural microclimate techniques from the country of his birth, Holland, he could successfully raise warm-climate species such as tegus outdoors in a relatively cool climate like central Alabama. Altogether, his book chronicles his adventures in elevating the sciences of herpetoculture and agriculture into an unparalleled art form. His multi-faceted enterprise, much of it constructed through his own hard labor, enabled him to enjoy discovery after discovery about breeding protocols for lizards and certain invertebrates (e.g., it is Bert we have to thank for the super mealworm [*Zophobus morio*] industry). Nevertheless, he somehow found time to write up many of his breeding successes, thereby sharing his discoveries with others across the rapidly-growing herpetocultural field. But Bert did not stop there. Through his broad diversity of talents he took great delight in speaking several languages (as well as reading herp literature in the original languages), and collecting traditional music of many cultures, all the while surrounding himself with family and many friends.

The book has no table of contents: each chapter recounts, year by year, Bert’s life experiences. The first chapter describes his roots (1495–1942). Born in 1944, Bert chronicled his life into 2008, the year that he died. The book is a fast read in part because almost every page has one or more black-and-white illustrations. The 440 pages of this autobiography contain well over 650 photos that accompany the text with remarkable fidelity. Only the 2 cover photos are in color. The book, a combination autobiography and biography is 473 pages (467 numbered) in length. A herpetological “who’s who,” *Lizard Man* includes contributions from several individuals who wrote the introduction (De Vosjoli), memorials (Gurley, Tremper, Rheinhardt, Love and Merker), and the obituary (Gurley). In all, the book is a well-deserved tribute to Bert.

There are 10 species-specific sidebar accounts in the last half of the book that detail Bert’s unique insights, largely on breeding discoveries. Richly informative, Bert used these sidebars to



share additional information such as his inside explanation about the disappearance of the black lacerta, the details of which were known only to Bert. Had time allowed, there is no doubt, that Bert could have assembled a book of these sidebars alone, relating his discoveries and insights about each species he had produced. Bert, well versed in genetics, was able to “listen to what his animals were telling him” at both the species and the specimen levels in order to develop his unique methods of managing and breeding the species in his care.

The book also includes a bibliography of 63 articles, books and news clips authored in part, or entirely by Bert. Conspicuous by their absence were a complete inventory of the many species and varieties Bert bred during his career, as well as a list of the many lectures he presented to herp audiences throughout the world.

Throughout the read I was reminded of his incredible (and sometimes diabolical) sense of humor, examples of which were peppered throughout. An example is the book’s rear cover photo of Bert holding a lizard by its head between his lips, a practice he developed that enabled him to retrieve up to 3 field-collected specimens (instead of 2 — one for each hand) until he could return to his vehicle for some bags. Certainly Bert saw, and capitalized on the humorous side of the photo. There were several more including a remark by the late Joseph Laszlo, the renowned reptile curator of the San Antonio Zoo. Joe was especially famous for his humorous “one-liners,” many of which were collected by James B. Murphy, retired Curator of Reptiles from Dallas Zoo, and included in his 1988 article: “In Memoriam: Joseph Laszlo” [Herpetological Review 19(1):5-6]. In fact, Bert relates a Laszlo remark that apparently never found its way into Jim’s account (Jim Murphy, pers. com.), which, by itself, is well worth the price of this book.

Few herpetologists and herpetoculturalists have captured the admiration of so many in the field. The late Bert, hardly immoderate in anything he did, accomplished a great deal both within and outside of his field of expertise: applied herpeto-agriculture. He had a brilliant mind that was never satisfied — he was continually looking for improvements and his learning curve, whether about lizards, herpetoculture, music, languages or new friends was ever on the ascent. His focus centered largely on lizard husbandry and after an idea was conceived, he would eagerly pick up a shovel, hammer and saw, and then with a wheelbarrow convert his plan to reality. Moreover, and over time, he would continually fine-tune his efforts in order to attain successful outcomes.

Bert’s wide array of adventures played out at the international level. As a youngster he grew up in Holland and as soon as he was old enough, he traveled to many neighboring coun-

tries, learning to speak the languages as he eagerly searched for species of herps he would see for the first time in nature. Early on, he began his mission to breed reptiles, particularly lizards, by acquiring several species native to Holland and surrounding countries. He then set up his trial breeding programs modifying various agriculture techniques to his purposes, his goal being to provide the best natural quarters possible to maximize reproductive potentials for each species. Successful he was! And because the required kinds of invertebrate food was simply not available, he had to provide his own solution, which was to establish several invertebrate cultures to meet the critical food requirements of his many offspring. On the one hand, his lizard-farming facility was intended to be labor saving, considering the large numbers of many species he was breeding. On the other hand, his remarkable (and almost overwhelming) success resulted in many hundreds of tiny hungry mouths in critical need of food! There was a certain irony in the fact that his initial successes in agro-lizard production required an enormous expenditure of energy in lizard food-farming to prevent project collapse.

I recall a lecture he gave during his first visit to the USA when he recounted details of his outdoor breeding techniques for numerous species of Old World lizards. Even more compelling was his account of the additional efforts he needed to put into live invertebrate cultures to feed his broad collection of hundreds of hungry neonates which often required age- and species-specific types of live food. Although I could understand perhaps 50% of his English at the time, together with his slides, the talk he gave made an indelible impression on me—here was a man, a schoolteacher, of enormous energy and talent, breeding many species that most of us in zoos would be lucky to have bred but one or two. That realization, based on his remarks on the many species, both lizards and invertebrates, underscored the depth of his passion and commitment. I was lucky enough to get to know him at that meeting; our friendship and sharing of information over the decades was, for me, a privilege and an inspiration.

Again on the international level, in 1985 when Bert decided to make his living solely by breeding lizards, he moved to the Canary Islands. Later, in 1988 he and his family arrived in Montevallo, Alabama, to launch his “Agama International Herpetological Institute” where, modeled after his successes in Holland, the breeding of lizards expanded and numbers of progeny increased exponentially. However, his remarkable success pointed to another critical need: marketing. Here was yet another frontier: he needed to generate customers, and in sufficient numbers to buy the many offspring he produced in order to keep “Agama International” solvent. Bert’s story about his remarkable success in raising lizards in quantity, and then needing to develop a subsequent market for their purchase is not unlike the story of George Washington Carver who, after developing methods of producing peanuts in large quantities, had to then create an expanded market to support that suddenly broadened agricultural abundance.

Among his strategies to market his lizard progeny he would travel to many European cities to further distribute his annual crop and give lectures along the way. However, these efforts produced yet an additional array of adventures of another kind. For example, while riding a train one of his satchels was stolen which contained slides he intended to use to illustrate a lecture and an old video camera he was using to document his trip. His solution, which betrayed his far-reaching sense of humor, had to wait for a future trip when he took along a spare suitcase filled with useless contents laced with poison ivy oil created for the sole purpose of attracting a future thief. Sure enough, along the way and on one of the trains, the “sting” satchel was stolen. No doubt Bert derived enormous satisfaction by imagining the many scenarios that could unfold as the crook handled the contents of the satchel, and eventually certain of his body parts as he would need to relieve himself, only to break out hours later, mystified, with the kinds of itchy blisters that only poison ivy can produce!

Discussion

Although a life list of Bert and Hester’s herp reproductive successes does not appear in this book, from 1970 through 2008 (nearly 4 decades) there were at least 139 species reproduced with a total of more than 66,000 progeny (pers. com., Timo Langerwerf). Over the decades, Bert and Hester developed their own market, both global and local, to sell the many species he produced. The kinds of lizards produced by Agama International reflected not only market demand, but Bert’s explorations into the reproductive biology of other species as well (i.e., research initiatives).

Bert’s fondness for breeding lizards is also remarkable because of the space requirements for breeding adults and the demands that most lizard progeny represent. Generally speaking, snakes, especially the live-bearers, tend to be less demanding in their management needs both among adults and progeny which may account for why so many herpeto-agricultural breeders concentrate their efforts on these (usually) less demanding species. How remarkably fortunate it is for the world of captive lizard populations and their managers that Bert’s fascination for the lizard segment of herpetology prevailed.

An article by Carrie Brenner (ReptileChannel.com; posted September 29, 2010) recounts the sale of the Agama International farm to new owners, Steve and Lauren Brooks in the summer of 2010. Best wishes go to Timo and Hester Langerwerf as they move on to new stages in their lives. To the Brookses, the very best of success as they take over where the Langerwerfs left off. With the growing demand for lizards in the herpeto-agricultural market and on-going discoveries of new lizard color morphs, successes should continue to unfold as the new owners take up the array of new challenges they face as they move their enterprise forward. In many ways they have a tiger (or hopefully a non-autotomous tegu?) by the tail!

What You Missed at the January Meeting

John Archer
j-archer@sbcglobal.net

Dream no small dreams. They have no power to stir the souls of men. – Victor Hugo

Ray Pawley has been professionally involved with reptiles and amphibians for most of his life. He was an early president of the Chicago Herpetological Society, struggling with lack of funds as he molded it toward what it's become today. He is the only zoologist / curator to have managed the extensive reptile collections at both Lincoln Park Zoo and the Brookfield Zoo. He has consulted with zoos throughout the world, developing new exhibits and techniques dealing with reptiles and amphibians. Along the way he increased attendance at the Brookfield Zoo's reptile house and gained experience at both private and public facilities. And he's dreamed—for 25 years. Few people are as qualified to have the kind of dream that Ray presented at the January meeting: "Let's Build a World-class Terrarium Here in Chicago. Why Not?"

He started by asking four questions: "How many of you remember seeing the reptile house at Lincoln Park Zoo? How many of you are satisfied with the way reptiles and amphibians are now being exhibited at Lincoln Park Zoo? How many of you remember seeing the reptile house at Brookfield Zoo? How many of you are satisfied with the way reptiles and amphibians are being displayed at Brookfield Zoo?" Nearly everyone raised a hand for the first and third question and no one had a raised hand for the second and fourth questions. For the many of you not familiar with Chicago's two zoos, both have closed reptile houses and decentralized the displayed animals by spreading them around the zoos. What this has meant is a drastic reduction in the number of animals on display and in the collections, a most unsatisfactory situation for those of us who are fascinated and interested in these animals.

For the next hour or so Ray presented his case for developing a world-class terrarium in the Chicago area. With no graphics save a few numbers written on a white board, Ray passionately and professionally presented his case. He wasn't talking about a storefront in a strip mall. He talked about the potential for a facility that would exhibit herps in ways and numbers far beyond anything that may be seen today, a super facility that would allow unprecedented concentration on herp displays, herp care, and herp research. A facility not overshadowed by those other taxa that zoos typically display, nor hampered by an administration that thinks of herps as the poor stepchild and gives financing and attention to the mammals, birds or aquatics. No small dream, indeed.

Based on attendance figures at the Brookfield Zoo's reptile house for more than 20 years, Ray extrapolated a potential annual attendance for a facility dedicated to reptiles and amphibians at about 2.5 million, a number larger than the annual attendance at any other zoo, museum, or aquarium in the Chicago area. Reptiles seem to have a magical pull that attracts



Photograph of Ray Pawley by Dick Buchholz.

more people to the reptile house than any other area of a zoo and holds them longer. Throughout his talk Ray continually expressed confusion and surprise that in spite of the numerous advantages, both the Chicago area zoos have closed reptile houses. And he is surprised that, based on the numbers, no stand-alone world-class terrarium has yet opened.

Independent self-supporting terrariums already exist. The Black Hills Reptile Gardens is over 70 years old and the St. Augustine Alligator farm is over 100 years old. In Tula, Russia, there is the relatively new Exoterium, and there are a handful of smaller terrariums in Australia, Asia, India and Africa. These facilities tend to be economical to operate and attract high attendance. But Ray wouldn't want to stop at a facility just dedicated to the displaying of reptiles and amphibians. He thinks that combining a paleontology museum with a live animal attraction would make the facility all the more attractive.

A few self-standing paleontological museums already exist in Moscow, Russia, and Munich, Germany, and in the U.S. in Hill City, South Dakota. The link between reptiles and dinosaurs is obvious, and the combination of the two draws should attract large crowds. Given the proper placement in the Chicago area and the proper staffing in administration, finance, public relations, education, veterinary services, maintenance, and the use of interns and volunteers, Ray feels that an annual attendance of 2 million visitors a year is not an unreasonable expectation, and that figure should easily allow the facility to finance itself. Ray then talked of some of his innovative ideas for the terrarium. He explored the possibility of recreating sets from the movie "Jurassic Park" at the entrance, immersion exhibits featuring landslides and floods, an Illinois reptile and amphibian wing, live representatives of extinct lineages displayed next to fossils or models of the dinosaurs, a library and archive dedicated to herpetology, and special experiences such as night tours that could generate extra income.

Ray used his long experience exhibiting and working with reptiles and amphibians to put together a credible presentation that showed a stand-alone herpetological and paleontological exhibit would be a financially viable facility...once it was built. The central problem is funds for construction and Ray admitted that he had not calculated that cost. When his throw-out figure of 40–50 million dollars was questioned as being far too low, Ray replied that it would be a start and with that money you could buy more than "... a garter snake in an aquarium." He reminded us that neither the Shedd Aquarium, nor any other major museum or zoo was cheap to construct, but they did get built. Someone had to raise or provide the funds. But first someone had to dream the dream.

Herpetology 2011

In this column the editorial staff presents short abstracts of herpetological articles we have found of interest. This is not an attempt to summarize all of the research papers being published; it is an attempt to increase the reader's awareness of what herpetologists have been doing and publishing. The editor assumes full responsibility for any errors or misleading statements.

GENETIC RESPONSE TO HABITAT FRAGMENTATION

E. D. McCoy et al. [2010, J. Herpetology 44(4):641-644] note that a recent study showed that populations of the threatened Florida sand skink, *Plestiodon* (formerly *Neoseps*) *reynoldsi* had limited loss of genetic diversity over the past 60 yr as a consequence of anthropogenic fragmentation. This study assumed that 60 yr represents 30–37 generations for the Florida sand skink, but a new evaluation of mark–recapture data shows that 60 yr represents only about 15 generations. This result suggests that too little time may have passed to observe the full genetic consequences of contemporary anthropogenic fragmentation in the Florida sand skink and reinforces similar results from other species. The authors suggest that snapshots of existing genetic variability in fragmented populations are limited in their ability to predict the evolutionary fate of a species unless life-history attributes of the organism are taken into account.

TRANSLOCATING BIG-HEADED TURTLES

J.-W. Shen et al. [2010, Chelonian Conservation and Biology 9(2):154-161] note that Asian turtles have declined substantially in recent decades because of the large-scale collection of wild individuals for the food, pet and medicine trades. This has hampered studies into the ecology and natural history of turtles in their natural habitats because many species have become so rare that they are simply unavailable for study. One way to re-establish or supplement these turtle populations is through translocation (either of wild-caught individuals or those raised in farms). However, successful translocation is partly dependent upon released individuals maintaining site fidelity. The authors translocated 16 big-headed turtles, *Platysternon megacephalum*, in southern China to study their movements and microhabitat use in the wild and use this information to evaluate the feasibility of translocation as a conservation technique for this species. Translocated turtles generally moved short distances (daily range: 0–89.6 m), with males moving further than females and both sexes moving further at night than during the day. Additionally, big-headed turtles rarely used terrestrial habitats (the maximum distance an individual was located from the stream was 5.8 m) and remained hidden in refugia most of the time. Some sex differences in microhabitat use were also apparent; females were visible less often, spent more time on land (which coincided with the nesting season), remained closer to the stream bank, used shallower water, and used different types of refugia than males. The very short distances that big-headed turtles moved, combined with their consistent fidelity to the stream and cryptic behavior, all suggest that this species would be a good candidate for larger-scale translocation experiments. This is the first published study of movement patterns and habitat use of translocated semiaquatic or aquatic turtles outside of Europe, and the first published radiotelemetry study of turtles from mainland China.

PHILIPPINE FOREST TURTLE CONSERVATION

S. Schoppe et al. [2010, Chelonian Conservation and Biology 9(2):145-153] note that the Philippine forest turtle, *Siebenrockiella leytensis*, is endemic to Palawan and Dumarán Islands. Its limited distribution, exploitation, and habitat destruction are the main threats to this Critically Endangered species. The populations of 5 sites in northern Palawan were assessed in terms of habitat, population size, density, and structure. Fieldwork was conducted from 28 January to 15 June 2007. Turtles were collected through visual encounters and with pitfall and baited funnel traps. All captured individuals were marked and released after standard measurements were taken. Considering the relatively short sample period, populations were considered “closed,” that is, with negligible birth, death and migration. Population size was then estimated using statistical analysis. Information on exploitation was gathered through interviews. Surveys revealed various degrees of habitat destruction and different levels of exploitation among sites. Population size estimates varied from 10 to 110 individuals per site, and in the majority of sites, adults were most prevalent. Densities ranged from 4.4 to 121.7 (mean 39.3 ± 49.5) individuals/ha. The highest density and largest population were found at the least disturbed site. Low densities were recorded in the more disturbed habitats, presumably as a result of exploitation. In 3 of the 5 sites turtles are heavily exploited either for local food consumption or for the international pet trade. Findings justify its current status as Critically Endangered. In situ conservation of the most pristine population is recommended in line with further research on the biology, ecology, and distribution pattern of the species.

GIANT GARTERSNAKE HABITAT

B. J. Halstead et al. [2010, Copeia 2010(4):591-599] note that factor analysis-based habitat suitability models can be used to describe the ecological niche of a species and identify locations where these conditions occur on the landscape using existing occurrence data. The authors used factor analyses to assess the suitability of habitats for *Thamnophis gigas* (giant gartersnake), a rare, threatened species endemic to the Central Valley of California, and to map the locations of habitat suitable for *T. gigas* in the Sacramento Valley. Factor analyses indicated that the niche of *T. gigas* is composed of sites near rice agriculture with low stream densities. Sites with high canal densities and near wetlands also appeared suitable, but results for these variables were sensitive to potential sampling bias. In the Sacramento Valley, suitable habitats occur primarily in the central portion of the valley floor. Based upon the results of the factor analyses, recovery planning for *T. gigas* will require an on-the-ground assessment of the current distribution and abundance of *T. gigas*, maintaining the few remaining natural wetlands and the practice of rice agriculture in the Sacramento Valley, and studying the effects of agricultural practices and land use changes on populations of *T. gigas*.

Unofficial Minutes of the CHS Board Meeting, January 14, 2011

The meeting was called to order at 8:14 P.M. at the Schaumburg Public Library. Board members John Archer, Greg Brim and Lawrence Huddleston were absent.

Officers' Reports

President: Jason Hood welcomed everyone to the first meeting of the 2011 board.

Recording Secretary: Cindy Rampacek read the minutes of the December 17 board meeting, and they were accepted with minor corrections. Cindy posts the minutes at the end of each board meeting. She urged the board to double check what she posts prior to the next board meeting.

Treasurer: Andy presented the December financial report. It was discussed and accepted.

Membership Secretary: Mike Dloogatch read a list of memberships expiring this month. Many of the lapsed memberships were grant applicants from the previous year. We had several new memberships.

Corresponding Secretary: Deb Krohn wants to change the CHS voicemail message, as it is long and cumbersome. There were no objections.

Sergeant-at-arms: Cindy counted 61 attendees at the December holiday meeting.

Committee Reports

Shows:

- Notebaert, January 1, 2.
- Great Lakes Pet Expo, February 5, 2011

Old Business

Magnets: Cindy Rampacek will get several quotes before the February board meeting. "I Brake for Snakes" is a preferred theme—ribbon magnets or possibly stop signs.

New Business

John Archer was informed last month that the CHS is entitled to receive a distribution from a trust that was set up by a former member who recently died. CHS member Peter Berg is an attorney and he has offered to look out for our interests pro bono. Peter has requested a copy of the trust and will advise us on how much to expect and how best to proceed.

Board meetings: A few places have offered us their facilities for a board meeting. The Grove has invited us and we will get with them about holding the May Meeting there.

Picnic and zoo trip: Cindy Rampacek will take over the spring picnic planning. St. Louis Zoo trip is being looked into by Deb Krohn for Saturday, June 25.

ReptileFest: John Archer is handling advertising. Andy Sagan has a friend with a small marketing firm and they have assigned an intern to help us. Jason Hood is handling vendors. Mary Hoppenrath will help Deb Krohn to recruit nonprofits to display. Cindy is going to look into getting on Steve Dale's radio show. We expect to have a signed contract for the facility next week. Flyers and cards as well as zoo advertising will be arranged by next month. The video that John Christianson shot at 'Fest two years ago will soon be ready to post.

We have sold the last of Kate Jackson's *Katie of the Sonoran Desert* children's books. When Mike tried to arrange sending her the proceeds, she told us to accept them as a donation.

Round Table

Jessica Tschampa looks forward to participating on the grants committee.

The meeting was adjourned at 9:38 P.M.

Respectfully submitted by recording secretary Cindy Rampacek



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For sale: Rats—live or frozen. I breed rats for my collection of boas so only top quality lab chow and care will do, I'm now offering surplus animals for sale. Located in far south suburbs of Chicago. Only orders of 20 or more please, no large rats will be available. For current availability and prices, please e-mail Steve at smuys@sbcglobal.net.

For sale: New book, 2011, just released: *Matamatas; The Natural History, Captive Care, and Breeding of Chelus fimbriatus* by David Fogel. The most comprehensive volume on this fascinating turtle. Well researched, 64 pages, with 49 literature citations. Well illustrated with 58 full-color photographs of captive specimens, their enclosures and filtration set-ups, wild specimens, and habitat. This book in the Turtles of the World Series will present readers with a look at the life of this amazing turtle in nature and in captivity. Enclosure designs, filtration details, and specific captive care requirements are included. Signed or personally inscribed and signed (provide instructions with order) copies are available from the author for \$12.99 each plus shipping (\$3.00 for the first copy & \$1.00 each additional copy to US addresses, and \$7.00 each for international destinations). Send check or money order to: David Fogel, 1750 Haines Road, Orwell, OH 44076. Payment through PayPal (including credit card payments) can also be accepted at herphouse1@aol.com. Please send any inquiries to this e-mail address.

For sale: Trophy quality jungle carpet, diamond-jungle, and jaguar carpet pythons. Website: moreliatrophyclub.com E-mail: junglejohn@tds.net.

Herp tours: **Costa Rica herping adventures**. Join a small group of fellow herpers for 7 herp-filled days. We find all types of herps, mammals, birds, and insects, but our target is snakes. We average 52 per trip, and this is our 10th year doing it. If you would like to enjoy finding herps in the wild and sleep in a bed at night with air-conditioning, hot water and only unpack your suitcase once, instead of daily, then this is the place to do it. Go to our web-site <http://hiss-n-things.com> and read the highlights of our trips. Read the statistics of each trip and visit the link showing photos of the 40 different species we have found along the way. E-mail at jim.kavney@gmail.com or call Jim Kavney 305 664-2881

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Wildlife Tours to Brazil and Australia: Visit the Amazon and Pantanal, July 31–August 15, and Queensland/Kakadu National Park, October 21–November 7, 2011. Although the focus is on birds on both of these trips, we will see much other wildlife, too. All of our local guides are excellent all-round naturalists. On last year's Australia trip, we saw many herps including both freshwater and estuarine crocodiles, saw-shelled turtles, Boyd's forest and eastern water dragons, land mullet, lace monitor, frill-necked lizard, carpet python, and taipan. Mammals seen included ten kinds of kangaroos and their kin, flying foxes, dingo, and platypus. And red-tailed black cockatoos, golden bowerbirds, wedge-tailed eagles, Gouldian finches, a cassowary. . . . The Brazil tour offers many wildlife possibilities including rheas, hyacinth macaws, hoatzins, toucans, Brazilian tapirs, giant otters, capybaras, pumas, jacare caiman, caiman lizard, golden tegu, green and yellow anacondas, and the bushmaster. We stay in comfortable accommodations and relish tasty meals. Maximum group size is nine for Brazil and fourteen for Australia. If you enjoy visiting wild places with knowledgeable local naturalist guides in the company of fellow travelers who appreciate nature as you do, then consider these two journeys to spectacular settings. The Brazil tour's land cost is \$4995 and Australia's is \$5495, both costs are per person double occupancy. For itineraries, please contact Bill Turner at (303) 795-5128 or e-mail: toursbyturner@aol.com

Line ads in this publication are run free for CHS members — \$2 per line for nonmembers. Any ad may be refused at the discretion of the Editor. Submit ads to: Michael Dloogatch, 6048 N. Lawndale Avenue, Chicago IL 60659, (773) 588-0728 evening telephone, (312) 782-2868 fax, E-mail: MADadder0@aol.com

News and Announcements

2011 CHS GRANT RECIPIENTS

The CHS Grants Committee has chosen the CHS grant recipients for 2011. The committee consisted of John Archer, Michael Dloogatch, Jason Hood, Amy Sullivan, Steve Sullivan and Jessica Tschampa. This year we received 24 applications, as usual exceeding the number of grants that could be awarded based on available funds. After a difficult decision process, 7 grants were awarded, in varying amounts, as follows:

- Melissa Amarello, SoLS Graduate Program, Arizona State University. “The Role of Kin Selection in Rattlesnake Aggregations,” \$1,000.
- Gerardo Antonio Cordero, Ecology, Evolution and Organismal Biology, Iowa State University. “How Does the Turtle’s Shell Get Its ‘Hinge’?” \$500.
- Richard L. Essner, Ph.D. Department of Biological Sciences, Southern Illinois University Edwardsville. “Captive Husbandry in the Rocky Mountain Tailed Frog, *Ascaphus montanus*,” \$1,000.
- Maxwell B. Joseph, Department of Ecology and Evolutionary Biology, University of Colorado, Boulder. “The Legacy of an Emerging Disease: Post-epizootic Pathogen Persistence in the Landscape,” \$500.
- Justin Perrault, Department of Biological Sciences, Florida Atlantic University. “Salps to Sea Turtles: Mercury and Selenium Concentrations in Leatherback Sea Turtles and Their Prey. Does Biomagnification Lead to Low Hatch and Emergence Success?” \$500.
- Joshua Scholl, Florida Atlantic University (undergraduate). “Gopher Tortoise Burrow Distribution and Demography in a Declining Southeastern Florida Habitat,” \$1,000.
- Melanie N. Stock, Department of Soil Science, University of Wisconsin–Madison. “Urban Heat Island Effects on Deep-Terrestrial Hibernating Amphibians,” \$500.



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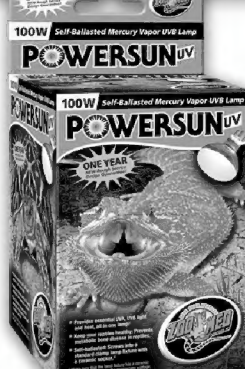
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ReptileFest 2011, April 9, 10

UPCOMING MEETINGS

The next meeting of the Chicago Herpetological Society will be held at 7:30 P.M., Wednesday, February 23, at the Peggy Notebaert Nature Museum, Cannon Drive and Fullerton Parkway, in Chicago. **Dr. Theresa L. Wusterbarth** of Northeast Wisconsin Technical College in Green Bay will speak about her work on mating systems and sexual selection in natricine snakes. In her pioneering work partially funded by the CHS, Terri used DNA data to explore the relationships within populations and subfamilies of both Plains (*Thamnophis radix*) and Butler's (*Thamnophis butleri*) garter snakes, and also explored morphological traits and abnormalities of individual snakes' sperm cells.

At the March 30 meeting, **Dan Warner**, a postdoctoral research associate in the Department of Ecology, Evolution and Organismal Biology at Iowa State University, will describe his doctoral research at the University of Sydney (Australia) temperature-dependent sex determination of jacky dragons (*Amphibolurus muricatus*). His talk is titled: "Why Does Nest Temperature Determine Offspring Sex in Many Reptiles? A Case Study with an Australian Agamid Lizard." Dan has begun to work with the brown anole (*Anolis sagrei*) and through an outreach program in connection with that work became involved with Golden Apple winner **Aaron Reedy**, a biology teacher at Kelly High School on Chicago's southwest side. Aaron's students are doing valuable research into nest-site selection behavior in brown anoles and Aaron will give us a short summary of the students' findings.

The regular monthly meetings of the Chicago Herpetological Society take place at Chicago's newest museum—the **Peggy Notebaert Nature Museum**. This beautiful building is at Fullerton Parkway and Cannon Drive, directly across Fullerton from the Lincoln Park Zoo. Meetings are held the last Wednesday of each month, from 7:30 P.M. through 9:30 P.M. Parking is free on Cannon Drive. A plethora of CTA buses stop nearby.

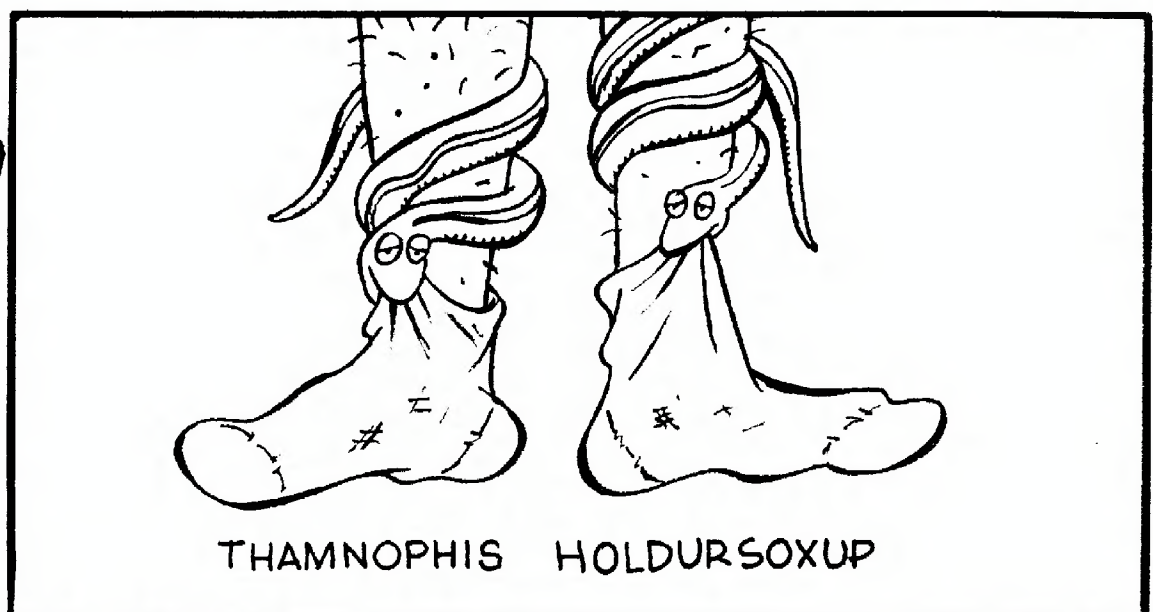
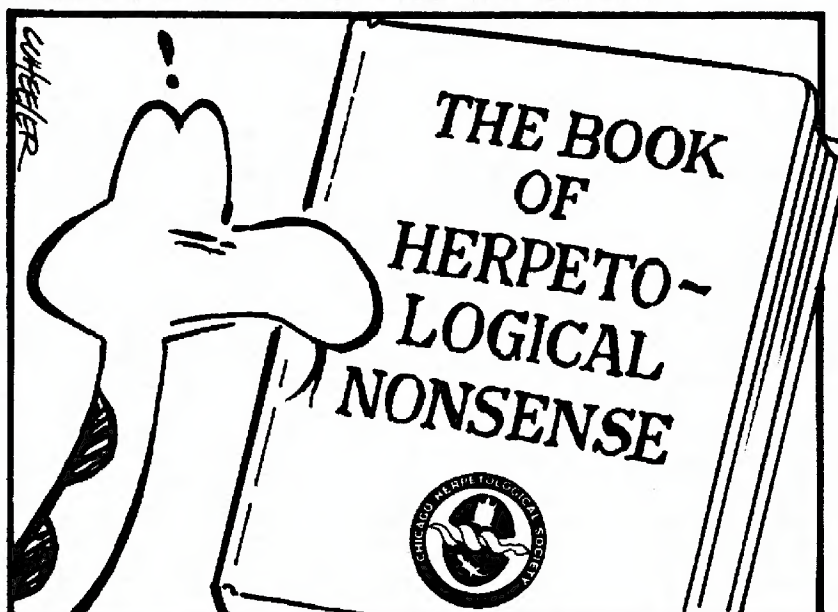
Board of Directors Meeting

Are you interested in how the decisions are made that determine how the Chicago Herpetological Society runs? And would you like to have input into those decisions? If so, try to attend the March board meeting. The March board meeting won't be held at the usual time and place, so call Jason Hood, 847-361-7363, if you're interested.

The Chicago Turtle Club

The monthly meetings of the Chicago Turtle Club are informal; questions, children and animals are welcome. Meetings normally take place at the North Park Village Nature Center, 5801 N. Pulaski, in Chicago. Parking is free. For more info visit the CTC website: <http://www.geocities.com/~chicagoturtle>.

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